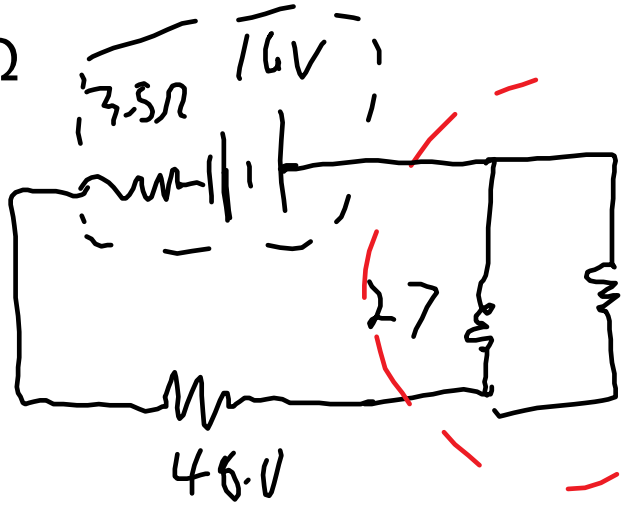
Circuits Review
Practice Test Answers:

1. 0.15Ω
2. 7.4V
3. 2.74W
4. 82mA
5. 2.4×10^5W
6. 30C
7. 0.43mΩ
8. 20V
9. 2.0Ω

3



$R_T = ?$

$\frac{1}{R_T} = \frac{1}{27} + \frac{1}{36}$

$R_{T_1} = 15.43\Omega$

$R_T = 3.5 + 48 + 15.43 = 66.9$

$I = \frac{V}{R_T} = \frac{16V}{66.9} = 0.236A$

$P = I^2R = (0.236)^2(48)$

$P = I^2 R = (\ldots)$

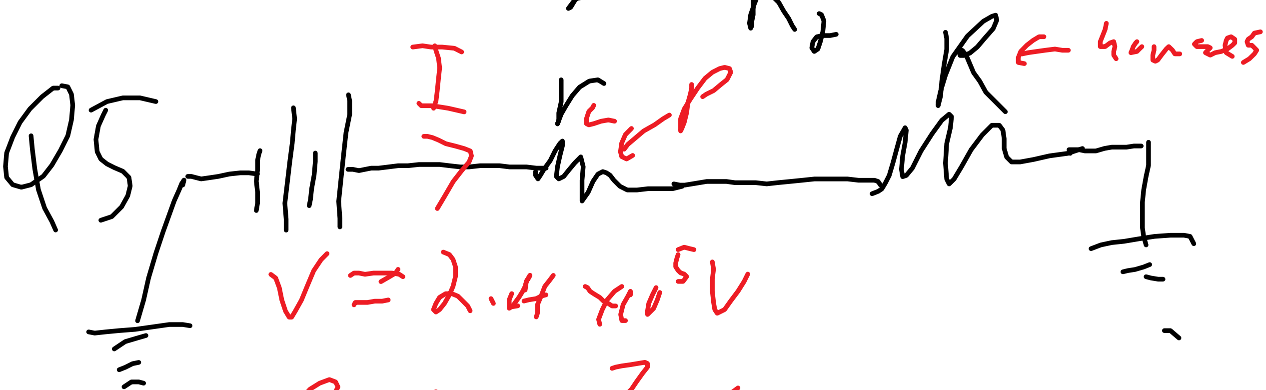
$= \boxed{2.74 W}$

4 $15V = 6.8V + V_2$

$V_2 = 8.2V$

$I_2 = \frac{V_2}{R_2} = \frac{8.2V}{100\Omega}$

Q5



$V = 2.4 \times 10^5 V$

$P = 8.5 \times 10^7 W$

$P = VI \quad I = \frac{8.5 \times 10^7}{2.4 \times 10^5}$

$P_L = I^2 r$

Q8 $P = I^2 r$ (I circled)

$P_1 = 0.50W = I^2 (25\Omega)$

$$I = \sqrt{\frac{0.5}{250}} = 0.04472A$$

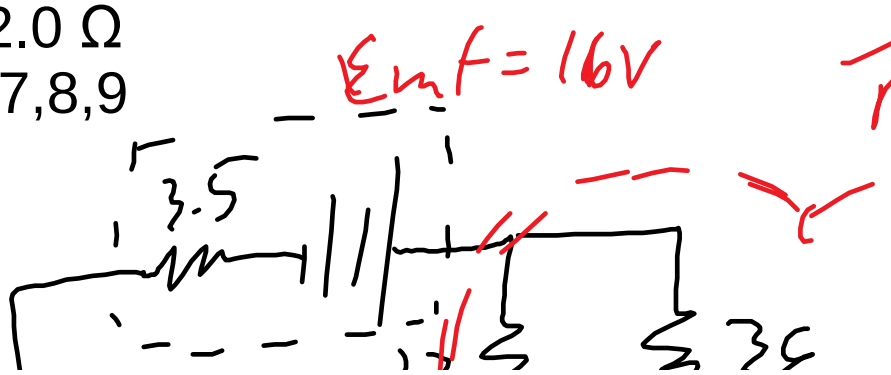
$$V = IR_T = 0.04472A\,(450)$$

$$\frac{1}{300} + \frac{1}{600} = \frac{1}{R_{T_1}} \quad R_{T_1} = 200$$

$$R_T = 200 + 250$$

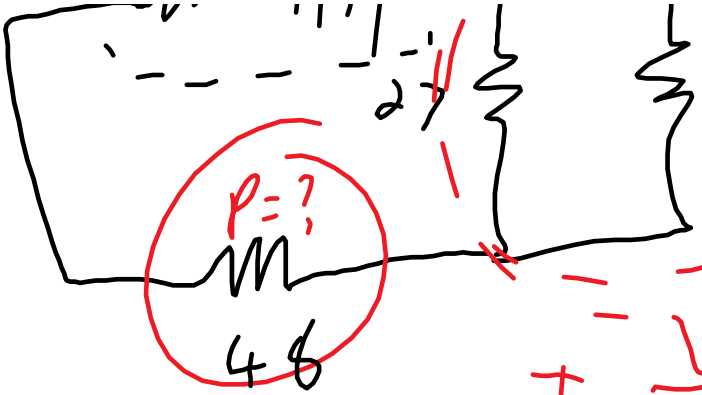
$$\boxed{V = 20.15\,V}$$

Q1 0.15Ω
Q2 7.4V
Q3 2.74W
Q4 0.082A
Q5 2.4×10^5W
Q6 30C
Q7 0.43mΩ
Q8 20V
Q9 2.0 Ω
Q3, 7,8,9



$$\frac{1}{R_{T_1}} = \frac{1}{27} + \frac{1}{36}$$

$$R_{T_1} = 15.4\Omega$$



$R_T = 3.5 + 48 + 15.4 = 66.9$

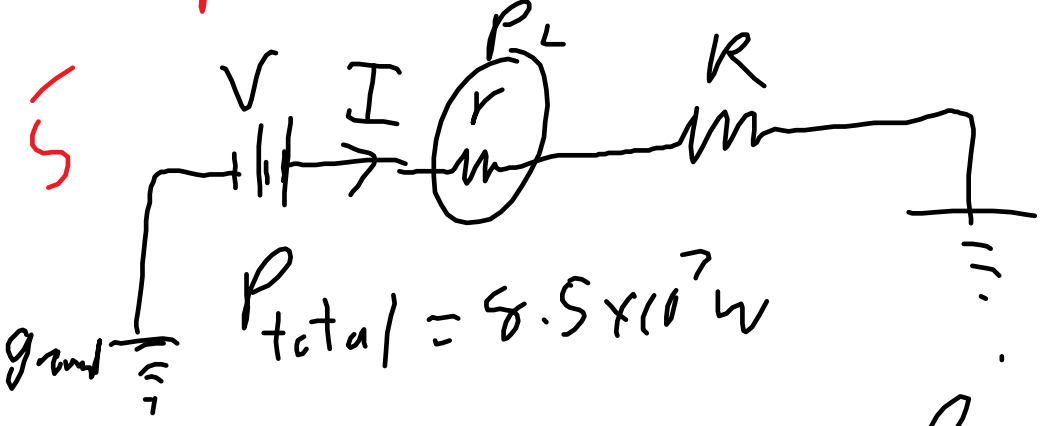
$I = \frac{V}{R_T} = \frac{16}{66.9} \leftarrow 66.4$

$P = I^2 R$

$= 0.239\,A$

$P = (0.239)^2(48) = \boxed{2.74\,W}$

Q5



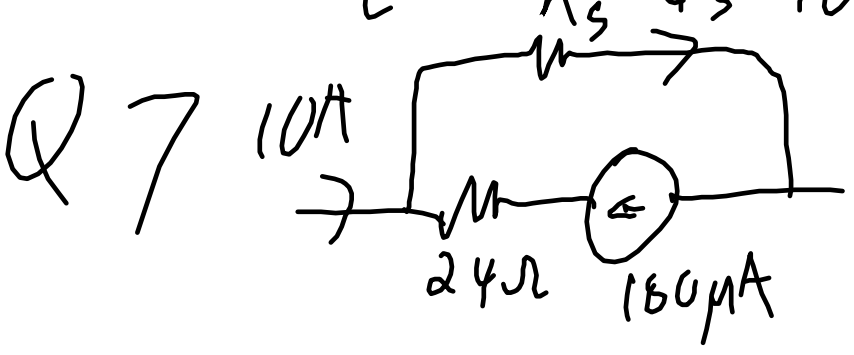
$P_{total} = 8.5 \times 10^7\,W$

$V = 0$

$P_L = I^2 r \quad I = \frac{P}{V} = \frac{8.5 \times 10^7}{2.4 \times 10^5} = 354\,A$

$P_L = 354^2 (1.92) = 2.4 \times 10^5\,W$

Q7



$R_S I_S = R_G I_G$

$R_S = \frac{24(180\mu A)}{11\,A}$

$= 430\,\mu\Omega$

$4.3 \times 10^{-4}\,\Omega$

Q8 - Trick -

which R dissipates the most P? $P = I^2 R$

(R_1)

$0.5W = I^2 (250\Omega)$

$I = \sqrt{\frac{0.5}{250}} = 0.0447\,A$

$V = I R_T$ ← R_{T_1}

$\frac{1}{R_{T_1}} = \frac{1}{300} + \frac{1}{600}$

$R_{T_1} = 200\Omega$

$R_T = 250 + 200 = 450$

$V = 0.0447 \times 450 =$ ___

Q9

$P_1 = 50W = I_1^2 r$

$P_2 = 200W = I_2^2 r$

$\frac{200}{5V} = \frac{I_2}{I_1}$

$I_2 = 2I_1$

$V = IR$

$60 = I_1(10+r)$ $\quad 60 = I_2(4+r)$

$\frac{60}{4+r} = 2I_1 = 2\left(\frac{60}{10+r}\right)$

$10+r = 2(4+r)$

$10+r = 8+2r$

$r = 2\Omega$

Practice Test

Q1 0.15Ω

Q2 7.4V

Q3 2.7W ✳

Q4 0.082A

Q5 2.4×10^5W

Q6 30C

Q7 $4.3 \times 10^{-4}\Omega$

Q8 20V

$\frac{1}{R_T} = \frac{1}{3\Omega} + \frac{1}{3\Omega}$

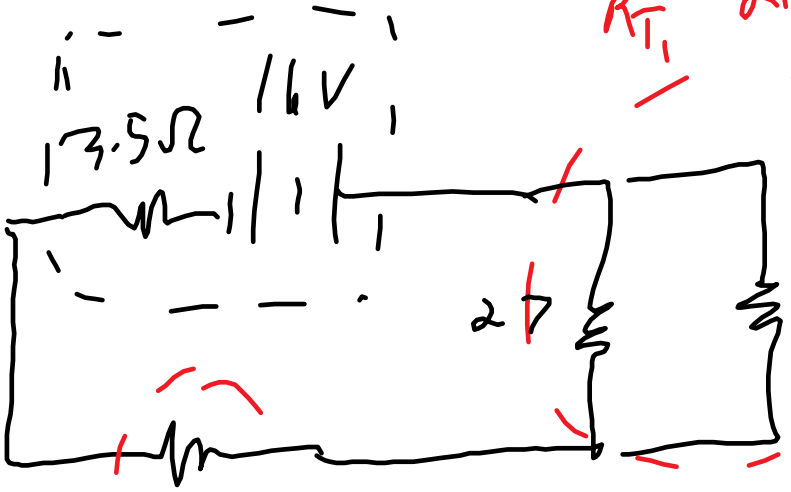
$R_T = 1.5\Omega$

Q7 4.3 x 10⁻²Ω

Q8 20V

Q9 2.0Ω

Q3

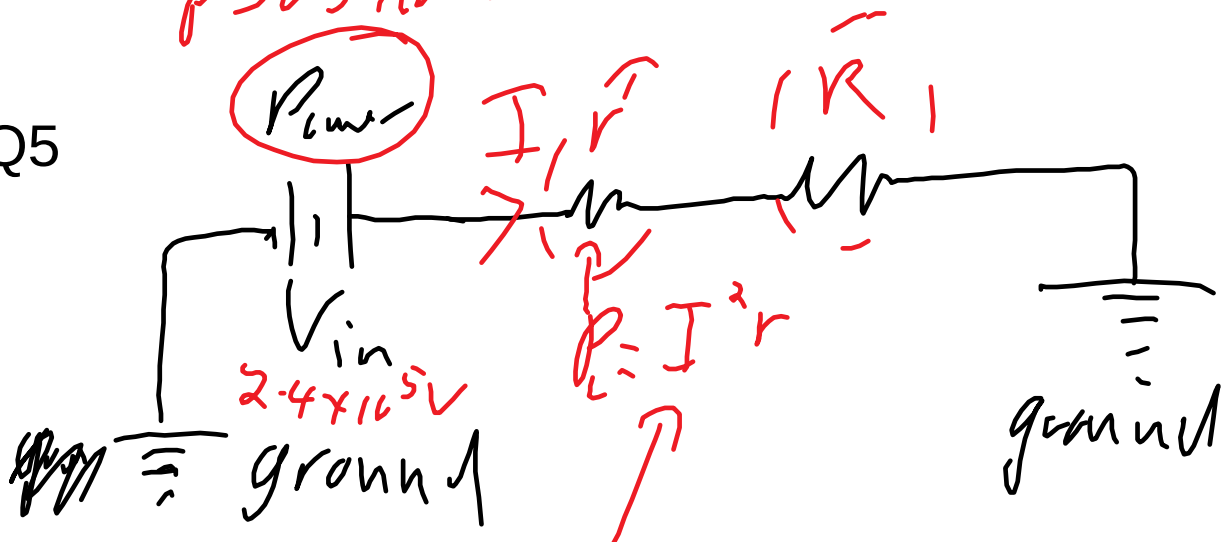


$R_T = 3.5 + 48 \text{ or } 15.4 = 66.9$

$I = \frac{16}{66.9} = 0.24A$

$P = (0.24)^2(48) = 2.74 W$

Q5



$P = 8.5 \times 10^7 W$

$I = \frac{P}{\quad} \quad 8.5 \times 10^7 = 253A$

$I = \frac{P}{V} = \frac{8.5 \times 10^7}{2.6 \times 10^5} = 353\,A$

$P_L = (353)^2(1.9) = 2.4 \times 10^5\,W$

Q6 $I = \frac{Q}{t} = \frac{P}{V}$ $Q = \frac{Pt}{V}$

$P = IV$

$Q = \frac{30 \times 15}{15}$

$= 30\,C$

Q4

The max power output is 0.5W, this doesn't mean all the resistors are using 0.5W, just one. Which one?
$P=I^2R$ so R_1 has the most current (series with the battery) so it will be the limiting resistor.

$0.5W = I^2(250)$
$I = \text{Sqrt}(0.5/250) = 0.044721359549958$
$V = IR_t$
$1/R_{t1} = 1/300 + 1/600$ $R_{t1} = 200\Omega$
$R_t = 200+250 = 450\ \Omega$
$V = 450 \times 0.044721359549958 = 20.12461179749812$

V=20V